

*ENVIRONMENTAL ASSESSMENT
OF THE
OPERATION AND MAINTENANCE
OF*

BARRE FALLS DAM

WARE RIVER

BARRE, MASSACHUSETTS

Prepared by



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PREFACE

The purpose of this Environmental Assessment is to provide the basis for evaluation of the environmental impact on the project area due to the routine operation and maintenance of this flood control reservoir. Barre Falls Dam has been operated whenever necessary since it was constructed to prevent or reduce downstream flooding. Maintenance and management of the project, including the recreation facilities, during non-flood periods is also of primary importance. Enhancement of the fish and wildlife resources as well as protection of the environment within and around the reservoir area has been given careful consideration.

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I. PROJECT DESCRIPTION

A. INTRODUCTION

1. Location and Authorization

Barre Falls Dam is located on the Ware River in the town of Barre, Massachusetts, about 38 miles above the confluence of the Ware and Swift Rivers and 13 miles northwest of Worcester, Massachusetts. The reservoir extends upstream in the Ware River drainage basin along the East Branch and its tributaries, the Stevens Branch and Longmeadow Brook, and along the West Branch into the towns of Barre, Hubbardston, Rutland and Oakham. The project was authorized by the Flood Control Acts approved 18 August 1941 (Public Law 228, 77th Congress) and 22 December 1944 (Public Law 534, 78th Congress) as a component of the comprehensive system of reservoirs and channel improvements for flood control in the Connecticut River Basin.

Construction of the project was initiated in 1956 and completed in May 1958 at a cost of \$2,354,000.

2. Purpose

Operation of Barre Falls Dam effectively reduces flood stages at Ware, Palmer, Ludlow, Chicopee and other potential damage centers along the Ware and Chicopee Rivers. As a unit in the comprehensive plan of flood protection in the Connecticut River Basin, its integrated operation also reduces flood stages at potential damage centers along the Connecticut River below the mouth of the Chicopee River.

B. STRUCTURES AND RESERVOIR

1. Dam and Dikes

Barre Falls Dam is an earth and rockfill structure 885 feet long with a maximum height of 62 feet above the stream bed and an elevation 830 feet

above mean sea level (msl).

Other structures included in the project are three dikes along the rim of the southwestern arm of the reservoir; their total length is 3,215 feet and their maximum height is 48 feet.

2. Spillway and Outlet Works

The 60-foot-wide crest of the concrete chute spillway has an elevation of 807 feet msl, thus providing 23 feet of freeboard to the top of the dam.

The outlet works include a reinforced concrete conduit and gate structure controlling two gates, all founded on bedrock under the southeastern abutment of the dam.

3. Reservoir

If the reservoir should fill to the spillway crest, it would have a flood control capacity of 24,000-acre feet, equivalent to 8.2 inches of runoff from the project's drainage area of 55 square miles. At maximum storage the reservoir would have a surface area of 1400 acres extending approximately 3.5 miles upstream from the dam; its shoreline perimeter would measure more than 10 miles.

C. OPERATION PROCEDURES

Flood control operations at Barre Falls Dam are integrated with flood protection measures intended to protect not only the areas along the Ware River downstream from the dam, but flood plains on the Chicopee and Connecticut Rivers as well.

Operational procedures, in addition to those involving flood protection, include the close coordination of water intake and diversion from the Ware

River at the Coldbrook Diversion Intake, a facility owned and operated by the Boston Metropolitan District Commission (MDC). This intake is located approximately 4 miles downstream from Barre Falls Dam on the Ware River. The Coldbrook Intake serves to divert water to either the Quabbin Reservoir or the Wachusett Reservoir during the period from 15 October to 15 June. The Quabbin and Wachusett Reservoirs, destinations for the diverted water, are major elements in the water supply system for the city of Boston and other communities in eastern and central Massachusetts.

Flood control operations at Barre Falls Dam are governed by instructions relayed to the Project Manager from the Corps' Reservoir Control Center (RCC) in Waltham, Massachusetts. Data on river stages and precipitation are collected from a network of monitoring stations in the Ware, Chicopee and Connecticut River basins and relayed to the RCC.

Outlet gates are normally maintained in an open position so that natural river flows will pass through the dam with no reduction in the amount of water available for diversion at Coldbrook. The MDC is required by law to allow a minimum discharge of 132 cfs to pass their intake for use by downstream interests, providing, of course, that natural flow exceeds that amount. No diversion may take place if natural flows are less than 132 cfs. During the winter, from about 1 December to 1 April, the gates are partially closed in order to maintain a pool at a stage of 6 to 8 feet (776 to 778 feet msl) to insure that the gates do not freeze. A minimum flow of about 10 cfs from the reservoir is maintained at all times to sustain fish life.

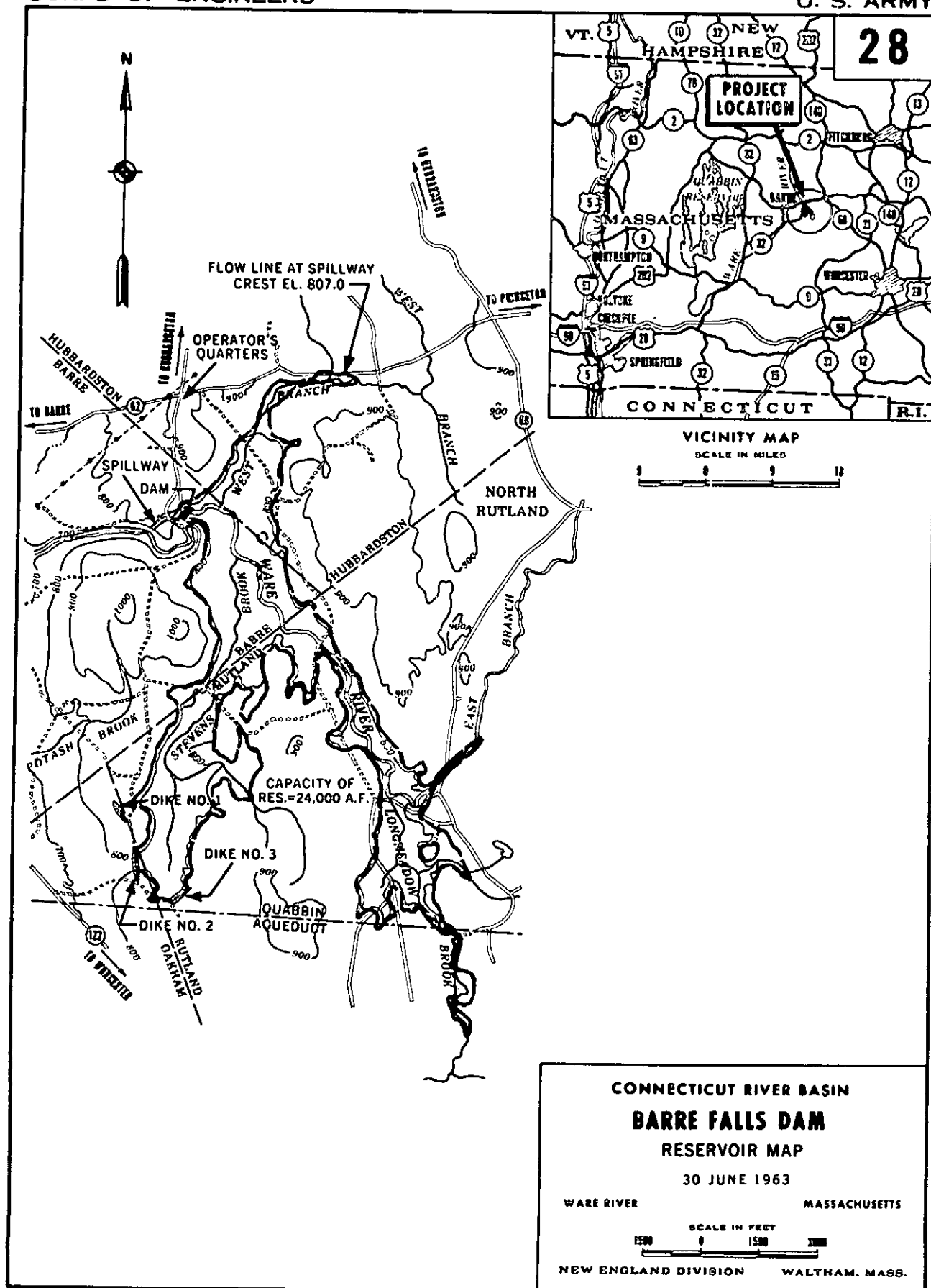
Any departures from normal routine operations are preceded by communications with and instructions from the RCC. Advisory communications are also sent to the MDC, especially during the diversion period, whenever any change is made in the outflow from the reservoir.

1. Flood Regulation

During the course of a flood, or in anticipation of one, regulation of flow from Barre Falls Dam occurs in three phases defined as follows: Phase I, the storm and runoff appraisal leading to the initial regulation of the reservoir; Phase II, regulation during the flood period; and Phase III, emptying the reservoir following the downstream recession of the flood.

2. Reservoir Regulation - MDC Diversion

As previously noted, the MDC owns and maintains the Coldbrook Diversion Intake, approximately 4 miles below Barre Falls Dam on the Ware River. Diversions to both the Quabbin and Wachusett reservoirs are possible from this intake and are operated by a siphon arrangement with flow meters which operate automatically and permit 132 cfs to pass the intake. The tunnel capacity of the Quabbin diversion is 890 cfs and the combined capacity to both Quabbin and Wachusett is 2960 cfs. The diversion tunnel to Wachusett Reservoir is seldom utilized because the water from the Ware River is so often highly colored by organic compounds that the settling-out of suspended solids prior to dispatch toward Boston is preferred in the Quabbin Reservoir. Adding the combined potential MDC diversion to the required bypass flow of 132 cfs gives a total manageable flow at Coldbrook of nearly 3,100 cfs. Inasmuch as the maximum design discharge



of stored water at the elevation of the spillway crest at Barre Falls Dam is only 3,000 cfs it is therefore evident that the magnitude of regulated releases from Barre Falls will usually be governed by flood conditions downstream of Coldbrook, and these during periods of non-diversion.

3. Cooperation with Downstream Water Users

It is the policy of the Corps of Engineers to cooperate, whenever possible, with downstream water users and other interested parties or agencies. This policy is especially relevant in the case of the agreement with the MDC regarding diversion of water which occurs at Coldbrook Intake. The Project Manager may be requested by other downstream users to deviate from normal regulations for short periods of time. Whenever a request for such modification is received, the Corps obtains assurances from other downstream water users that they are agreeable to the proposed operations.

D. MANAGEMENT PROGRAMS

The MDC owns nearly one-third (more than 21,000 acres) of the Ware River watershed upstream from the Coldbrook Intake. Some portions of the land within the boundaries of this MDC-owned land, however, are excluded from MDC management and control. The Barre Falls Dam project area is owned by the Federal Government and managed by the Corps of Engineers; it consists of 557 acres, which includes the dam and dikes along with some peripheral acreage and essential access routes, but excludes most of the reservoir. In addition, the Massachusetts Department of Environmental Management manages Rutland State Park, located about two miles southeast of the reservoir. The State Park, which includes about 1,400 acres of land, is outside of the reservoir area.

The Massachusetts Division of Fisheries and Wildlife conducts a fisheries and wildlife management program on portions of the MDC land and also, pursuant to an agreement with the Corps, on the 557 acres that are Federally owned. This program is, of course, consistent with requirements and regulations of the MDC for management of a public water supply watershed.

It is the responsibility of the Corps to maintain the roads traversing the 557 acres which it owns. Maintenance of the numerous dirt roads crisscrossing the reservoir area is, however, the MDC's responsibility. These roads are used by the public for recreational purposes, as well as by the MDC and the Corps in their routine inspection, maintenance and management programs. One such program, selective timber cutting, is undertaken from time to time by the MDC within the reservoir boundaries.

II. ENVIRONMENTAL SETTING

A. DESCRIPTION OF GENERAL AREA

1. Climate and Precipitation

The drainage basin of the Chicopee River and its tributaries lies in the path of the prevailing "westerlies" and of weather influences coming from the southwest. The area is also exposed to occasional coastal storms which travel up the Atlantic seaboard, some of which are of hurricane intensity. The storms constitute an infrequent but very important potential for flood-producing precipitation, especially from August to October.

The average annual temperatures in the area vary from 50°F in the hills to 55°F in the valleys. Recorded temperature extremes in the Chicopee

basin have varied from a maximum of 100°F to a minimum of -20°F. The growing season lasts from early May to late September.

Mean annual precipitation is about 50 inches in the headwaters area of the Ware River, with a recorded maximum of about 62 inches and a minimum of 33 inches. The mean annual snowfall is about 55 inches, equivalent to about 5.5 inches of water content. Though melting snow alone seldom produces damaging high water, the coincidence of snow melt and runoff from spring rainfall often results in substantially higher flood stages. Average annual runoff from the Chicopee River drainage basin is equivalent to 22.2 inches per year, or nearly one-half of the average annual precipitation in the basin.

2. Topography

The Ware River basin is characterized by low rounded hills and rather broad, but sometimes incised, valleys. Wachusett Mountain, 8 miles north-east of Barre Falls Dam and on the perimeter of the watershed, has an elevation of 2,066 feet msl; the lowest elevation in the watershed, at the confluence of the Ware and Quaboag Rivers which join to form the Chicopee River, is 302 feet msl. The drainage area of the Ware River Basin, exclusive of the Swift River watershed, is 219 square miles, and it is about 34 miles in length along its southwest-northeast axis. The drainage area controlled by Barre Falls Dam, however, is only 55 square miles. The river falls about 470 feet in its 33-mile southwesterly course from the conduit at the dam to its junction with the Quaboag River, or an average drop of about 14 feet per mile.

3. Vegetative Cover Types

The area surrounding the project is mostly wooded, consisting of interspersed stands of hardwoods and conifers. Numerous plantations, mostly of red pine, have been established by the MDC within the watershed. In addition there are minor areas of open acreage where brush and low vegetation predominate. Some of these areas are managed for wildlife by the Massachusetts Division of Fisheries and Wildlife. The major portion of the land subject to recurrent inundation is natural swamp and marshland, covered with brush, sedge grasses and other species of marsh vegetation, including some poplar, gray birch and other short-lived trees.

4. Fish and Wildlife Species Present

Wildlife within the reservoir area includes such animals as deer, fox, beaver, otter, skunk, muskrat, cottontail rabbits and the varying hare. Some quail, grouse, woodcock and migratory waterfowl can also be found in the area. The Division of Fisheries and Wildlife supplement these species by annually stocking pheasant in the project area.

Both cold and warm water fish species are present in the watershed. The Division of Fisheries and Wildlife annually stocks brook, brown and rainbow trout in the Ware River and its tributaries with the reservoir area.

5. Geological Features

The bedrock in this area is dense crystalline igneous and metamorphic rocks. Pre- and post-glacial erosion, plus the mantling with glacial till, is largely responsible for the low relief of the area. Areas of stratified

glacial deposits are generally limited to the valley bottoms. No exploitable mineral resources are known in the vicinity, save a few sand and gravel pits, some of which were last used when the dam and dikes were built.

6. Historic and Archeological Features

No historic or archeological sites are known within the reservoir area and, except for two 19th century cemeteries, no such sites are within close proximity of the reservoir.

7. Socioeconomic Conditions

The area around Hubbardston, Barre, Rutland and Oakham, within parts of which the Barre Falls Reservoir is located, has a somewhat isolated socioeconomic position in central Massachusetts. The area is about 15 miles northwest of Worcester, 11 to 15 miles south and southwest of the Gardner-Fitchburg region, and 40 miles northeast of the Chicopee-Springfield urban complex. Most of the four towns are agricultural-residential in nature. Barre has several medium sized industries, as does Rutland, which also has several educational institutions plus a regional state hospital.

The populations of the four towns follow:

	1960	1970	Percent Increase
Hubbardston	1217	1437	18
Rutland	3253	3472	7
Barre	3479	3533	2
Oakham	524	615	17

Except for a few small family-size farms very little agricultural activity is found in the region.

The project is midway between Massachusetts Routes 2 and 9, two east-west highways which traverse the state. There are numerous paved secondary highways which interconnect the scattered towns and villages of this rural region.

B. INTERRELATIONSHIPS WITH OTHER PROJECTS

The coordinated flood control plan for the Chicopee River basin includes operation of Barre Falls Dam on the Ware River and Conant Brook Dam on the Quaboag River, plus five local protection projects. Also the MDC's operation of the Coldbrook Intake has incidental effects on flood control in the basin, necessitating close cooperation with the Corps of Engineers. The control of floods in the Chicopee River basin is, in turn, integrated with similar plans for flood prevention in the Connecticut River basin.

III. ENVIRONMENTAL IMPACT OF THE OPERATION, MAINTENANCE AND MANAGEMENT PROGRAMS

A. OPERATION FOR AUTHORIZED PURPOSES.

1. Downstream Effects - Regulation of Flows and Releases

a. Flooding Prevented

Operation of Barre Falls Dam effectively reduces flood stages at potential damage centers along the Ware and Chicopee Rivers. As a unit in the comprehensive plan of flood protection in the Connecticut River Basin the dam also reduces flood stages along the Connecticut below the

mouth of the Chicopee River. There have been eighteen significant reservoir operations since completion of the project in 1957; the largest operation, that of April 1960, utilized 55 percent of available storage capacity and at two other times, April 1962 and March 1968, the reservoir was more than 22 percent full.

The major potential damage centers in the Ware and Chicopee basins are the residential, commercial and industrial areas in the flood plain downstream from the confluence of the Ware and Quaboag Rivers at Palmer. Industrial sites in both Barre and Ware, on the Ware River, are also located in flood hazard areas. There is little agricultural land subject to serious damage from flooding in the watershed.

b. Fish and Wildlife

During nonflood periods, the Ware River flows unrestricted through Barre Falls Dam and no unnatural effects on downstream biota are experienced. No permanent pool is maintained at the dam and consequently no seasonal or controlled changes in flow normally occur.

The MDC's management policies to insure both the adequacy and quality of the water resources from the watershed upstream from the Coldbrook Intake also aid in protecting and enhancing the fish and wildlife resources.

Stocking of hare, pheasant and trout by the Massachusetts Division of Fisheries and Wildlife is annually carried out within the project area, as well as within those surrounding areas owned by the MDC both upstream and downstream from the dam.

c. Vegetative Cover and Timber

Regulation of flows and releases have had no appreciable or apparent effect upon vegetation or timber on riparian lands downstream from the Barre Falls Dam.

d. Water Quality

The Ware River, from its headwaters to a point 12 miles downstream from Barre Falls Dam, is classified by the State of Massachusetts as an "A" stream. Such waters are designated for use as public water supplies and are of uniformly excellent character. Criteria for Class A streams state that dissolved oxygen concentrations cannot be less than 75 percent saturated during at least 16 hours of any 24-hour period and not less than 5 mg/l at any time. No increase in temperature, pH, color, turbidity, taste and odor other than what naturally occurs is permissible. Total coliform bacteria cannot exceed an average value of 50 counts/100 ml during any monthly sampling period.

The Corps of Engineers has irregularly monitored the quality of the water passing through the dry bed reservoir since 1970. The mean dissolved oxygen content levels for a seven-year period (1970-1976) at all three sampling stations (two upstream and one downstream from the dam) are all at or over the 90 percent saturation value.

The chemical characteristics of the Ware River in the project area reflect the presence of the significant number of swamps upstream from the dam. The mean pH values vary at the three sampling stations from 6.0 to 6.2. The water is colored and the elevated concentrations of iron, ammonia and phosphate ions indicate their complexing tendencies with the humic water.

The elevated heavy metals concentrations of copper, lead and zinc also reflect the character of humic streams with low dissolved solids and acidic pH. The solubility of heavy metals concentrations is greatly increased in the presence of humic substances.

During the monitoring period 13 total coliform bacteria samples have been collected at the station downstream from Barre Falls Dam. The mean value of the samples is approximately 2060 counts/100 ml, with a maximum of 6100 and a minimum of 20. A significant portion of these values may be influenced from vegetative sources. However, a mean fecal coliform bacteria value of 38 counts/100 ml is significant and indicates that some ~~mammalian~~, possibly human, source is also present.

e. Recreational Uses

Recreational uses of the project area and downstream are not intensive; they include stream-fishing, hunting, hiking, horseback riding, canoeing, and snowmobiling. Regulation of flows, inasmuch as they occur only during times of flooding, has little effect on downstream recreation. It is significant to note that of the eighteen significant storage operations during the last twenty years, ten occurred during the months of March and April, periods of minimal outdoor recreational activity.

2. Upstream Effects - Temporary Inundation

a. Fish and Wildlife

Water level fluctuations in the relatively shallow and well drained reservoir area are of only a few days duration. If, as sometimes happens, flooding occurs just prior to or during the first few weeks of the trout fishing season, access to the stream is impaired and stream fishing in the

reservoir area may be impossible. Natural reproduction of trout and other aquatic life is not likely to be seriously affected either by short intervals of higher water levels or by the stranding of organisms in isolated pools, however some dispersion of individual fish may occur during pool drawdown.

Wildlife inhabiting the project area upstream from the dam is, in general, only temporarily affected by flooding. Some direct losses, however, will be felt by such species as woodchucks, rabbits and hares, some of whose spring litters may be drowned in their burrows. The muskrat population, among the aquatic fur-bearing species, would be most adversely affected if the area becomes icebound during floods. Mink and otter, however, are more able to adjust to such temporary changes in water level. Deer and other ranging wildlife, both herbivores and carnivores, are only indirectly affected by temporary changes in the water regimen.

Although utilization of the project area by waterfowl is not high, fluctuating water levels can be detrimental during the nesting and brood-rearing period. Storage operations also may temporarily reduce the available food supply for ducks when aquatic and emergent vegetation on the low-lying swamp and marshland is flooded.

Stocking of pheasants has recently occurred on lands in the reservoir area so as to meet increasing hunting demand. Stocking occurs before and during the hunting season, since habitat for sustaining pheasants is of a marginal quality. The better habitat is situated above the level of flooding.

b. Vegetative Cover and Timber

Flooding of the Barre Falls Reservoir has less serious consequences for plant life than at many other flood control projects in New England. Because so much of this reservoir is natural swamp and marshland and because flooding does not usually occur during the height of the growing season it is very likely that the area will retain its general vegetative character throughout the life of the project.

Prime determinants of vegetative and timber losses are the depth and duration of flooding as well as the amount of siltation which occurs at growing sites. But because the maximum depth of temporary flooding is only 27 feet at the dam, and much less than that throughout the rest of the reservoir, and because the watershed is largely forest-covered and there are minimal amounts of sediment carried into the reservoir by flood runoff, the losses to vegetation and timber are minimal.

Considerable volumes of timber are annually harvested on a selective-cutting basis by the MDC in the areas surrounding the reservoir. According to the MDC, there is a considerable amount of valuable timber in the project area which has not and probably won't be cut, because its primary function is protection of the watershed.

c. Recreational Uses

As previously discussed, springtime flooding may delay access by fishermen to the trout waters, and water-related recreational use of the area is mostly by fishermen.

There is considerable use of the uplands and forested areas by hunters, hikers, horseback riders and snowmobilers. The network of dirt

roads, logging trails and paths throughout the area provides excellent opportunities for these activities. However, portions of some of these roads are subject to flooding. Bridges across Longmeadow Brook, Stevens Brook, and the East Branch of the Ware River are within the reservoir area and may require periodic maintenance if debris becomes lodged in them during times of flood. Maintenance of these roads is the responsibility of the MDC.

The only picnic area within the project is maintained by the Corps of Engineers just east of the dam and across the road from the Project Manager's office. This picnic area consists of four picnic tables and two fireplaces and is not subject to flooding. Other informal and undesignated picnic sites throughout the area, mostly on MDC land, are randomly used by visitors to the reservoir.

d. Aesthetics

Authorized flood control operations cause no major aesthetic problems at Barre Falls Dam. No significant vegetative losses have occurred, primarily because of the shallow depth of impoundment. Also, because no permanent pool has been maintained, the necessity of clearing the impoundment area has been avoided. Most vegetation has survived recurrent inundation and thus it contributes to the high aesthetic values in the project area. Degradable debris collected at the log boom upstream from the dam during flooding is easily cut up and disposed of. The silt that often covers low-lying vegetation after drawdown of a flood pool may be visually offensive, but subsequent rainfall aids in restoring a more natural appearance within a short time by washing away accumulated sediments.

e. Beneficial Uses of Water

The important adjunct feature of the Barre Falls Reservoir as a watershed for public water supply appears not to be adversely affected by water level fluctuation during temporary inundation. Although organic matter, suspended solids and other pollutants may increase slightly due to flooding of areas in the reservoir, these short-term changes have not been great enough to warrant any special considerations by the MDC.

B. OPERATION AND MAINTENANCE OF PROJECT FACILITIES

1. Recreational Facilities

The Corps of Engineers maintains the only permanent public recreational facility in the project area, a picnic site with four picnic tables and two fireplaces near the dam. Considering the relatively small acreage within the reservoir area which is owned and managed by the Corps this limited development is all that is considered feasible at this time.

Because of the nature of the watershed as a source of public drinking water, recreational use of the area must be restricted to the nonintensive sort. Hunting and fishing opportunities attract many of the visitors. Other persons make use of the area for hiking and horseback riding, and trails for these purposes have been marked by organized groups, with the permission of the Corps and MDC, in the reservoir and on adjacent lands. Snowmobile trails have also been designated over the dirt roads and logging trails which criss-cross the MDC-owned land. Opportunities for development of further recreational facilities are limited due to extensive MDC ownership and the need to protect the watershed as a source of public water supply.

2. Waste Disposal

The Corps provides several trash containers at appropriate locations in the project area which help to minimize litter problems.

3. Weed and Brush Control

Approximately 12 acres of Corps land is mowed seasonally, mostly near the dam and along the access road to the dam. In addition, the Massachusetts Division of Fisheries and Wildlife maintains 10 acres of open fields by periodic brush cutting.

C. MANAGEMENT OF PROJECT LANDS

1. Rules and Regulations

Rules and regulations for projects managed by the Corps of Engineers, in addition to insuring effective and efficient flood management operations, also provide for the safety and convenience of the visiting public. Negative signs and warnings have been held to a minimum so that the public may enjoy maximum freedom without unnecessary restraints.

Because the watershed is continually utilized for public water supply no swimming or motorboating is allowed. There is, however, little temptation for the public to engage in these activities because beach areas do not exist and the nature of the waterways is not conducive to much more than traverse by canoe.

The Massachusetts Division of Fisheries and Wildlife has conspicuously posted, in several areas, its regulations concerning hours for hunting during the appropriate seasons. In addition, band-return boxes are located at places generally convenient for bird hunters.

Barricades restricting public passage along roadways on both Corps and MDC land are erected during times of a rising flood pool. It is the responsibility of the MDC, after an alert from the Corps, to erect barricades at the several access roads leading into the reservoir area from MDC land; the Corps Project Manager is responsible for barricading roads on Corps property.

2. Fish and Wildlife Management

The Massachusetts Division of Fisheries and Wildlife is responsible for a fisheries and wildlife management program on both the Corps and the MDC-owned property at Barre Falls Dam. In managing the reservoir for fish and wildlife, the Division makes no distinction as to land ownership and the properties of the Corps and the MDC are managed as a single unit.

The reservoir area is periodically stocked with pheasant and, when available, with hare, so as to improve the hunting opportunities. Recent hunter utilization surveys have shown harvests made of pheasants, ruffed grouse and woodcock, as well as varying hares in the project area. Grouse and woodcock are not among those species stocked.

As a part of the wildlife management and habitat improvement program a few acres of open space and edge are maintained by brush cutting, top dressing and mowing, and smaller areas of rye are sometimes seeded and fertilized. This program is particularly relevant to game birds and other small species of wildlife. Though deer are found in the area no special attention is paid to the management of this popular game animal. The same is true of other game species, with the exception of the occasionally stocked hare.

Fisheries management is mostly devoted to periodic stocking of trout at various places in the Ware River and its tributaries. Brook, brown and rainbow trout have been stocked in the Ware River basin, primarily at those points on small streams which have the best trout habitat.

Though no routine samplings of fish catches in the Ware River basin are made, a 1972-73 fisheries survey and inventory of the total watershed showed 24 species of fish inhabiting these waters. Because of the presence of numerous upland marshes and the ease with which these areas are warmed by the sun, and because of bottom conditions, many stretches of the streams and tributaries draining into the Barre Falls reservoir are not particularly good trout habitat. For the Ware River basin as a whole, 6.6 percent of the species inventoried were game fish, 11.1 percent panfish and 82.3 percent forage fish. Considerable variability in fish populations and species compositions is to be found in the area. There is no routine management of the warm water fisheries, composed primarily of pickerel, brown bullhead, bluegill, pumpkinseed, yellow perch and largemouth bass, which attract some fishermen to the area.

3. Recreational Use and Management

No formal recreational management plan exists for either the Corps land or the surrounding MDC land. Use of the land for recreational purposes is largely by individuals or small groups who pursue divergent and dispersed activities throughout the area.

As at other Corps projects, the Project Manager at Barre Falls Dam prepares monthly estimates of visitation to the Corps-managed area, based

on traffic counters and personal observation. Interpretation of such data compiled at Barre Falls is complicated by several factors: (1) the Corps-managed area is only 557 acres and is adjacent to MDC owned and managed land of much greater extent and of much higher recreational value which serves as the principal attraction for most visitors; (2) the visitation count is based upon vehicular traffic, and more specifically, that which enters on only one of several access roads to the reservoir area; (3) some residents of the area use the road across the dam as a local short-cut and are thus included in the visitation count; and (4) visitor counts are subject to the errors inherent in the assumptions made for automobile occupancy and to the rough estimates of visitors when traffic counters are not used.

4. Forestry Management

Some small plantations of red pine have been established alongside access roads to the dam and dikes. Some weevil damage has occurred on a pine plantation south of the Project Manager's house but the trees seem to have survived the infestation. In the reservoir area, on land owned by the MDC, there has been extensive planting on previously open areas and silvicultural management programs are undertaken routinely. The Corps land is for the most part naturally wooded and does not lend itself to much more than the removal of fallen trees and general landscape enhancement. Some seeding and fertilizing of grasses for wildlife habitat is undertaken by the Massachusetts Division of Fisheries and Wildlife in a few open areas.

IV. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED AS A RESULT OF THE OPERATION AND MAINTENANCE PROGRAM

A. FISH AND WILDLIFE - DOWNSTREAM CHANGES

Barre Falls reservoir is empty except during flood periods and river flow is thus unaffected by the dam most of the time. The regulation of river flows to protect developed areas downstream unavoidably prevents or reduces flooding of natural flood plains, where seasonal or periodic inundation is known to be beneficial from the standpoint of groundwater recharge and maintaining ecological diversity and productivity. It should be pointed out that the Burnshirt River, whose flow is not artificially regulated, joins the Ware River about one mile below Barre Falls Dam at a point where the Ware valley leaves a narrow gorge and widens to include expansive marshland and flood plains. The uncontrolled spring freshets from the Burnshirt drainage area of 31 square miles partially offset the effects of flow regulation upstream of Barre Falls Dam.

B. WATER QUALITY

Downstream releases of flood waters temporarily stored in Barre Falls Reservoir during flood periods are not believed to have any unavoidable and adverse influences on water quality. Because of the coordinated involvement of the MDC in the operation and maintenance program at Barre Falls Dam, any such influences would have been recognized by the existing monitoring program. An increase in both turbidity and solids concentrations in Ware River water naturally occurs during times of flood, but temporary impoundment tends to allow the settling-out of at least some of the suspended

matter. On the other hand, the reduction of flow caused by storage of runoff for even a short time can cause an increase in the concentrations of pollutants discharged to the Ware River downstream, which might otherwise be diluted to more acceptable levels by the upstream waters. This concern is applicable to reaches of the Ware River below the Coldbrook Intake, where a minimum of 132 cfs must be allowed to pass downstream. Except in unusual situations, storage of flood waters in Barre Falls reservoir would not reduce flows sufficiently to cause significant water quality problems further downstream.

C. WILDLIFE HABITAT - PERIODIC INUNDATION

Periodic inundation of the reservoir area has an adverse, though unmeasured, effect on wildlife. Restrictions on range and mobility, the availability of food, and most importantly, the successful rearing of young are adverse effects which are caused by flooding. The above-average likelihood that floods will occur during the springtime when young mammals and waterfowl are unable to escape from their flood-vulnerable habitats is a significant effect of flood operations at the project. The fact, however, that most of the reservoir area is natural marshland to begin with and that indigenous populations are generally well adapted to this type of habitat decreases the severity of impact caused by inundation.

Offsetting potential adverse effects to wildlife are the management programs conducted by the Division of Fisheries and Wildlife. Stocking programs, and, to a lesser extent, the enhancement of habitat for upland game species are elements of these programs.

In summary, the adverse effects of periodic inundation are of local and short-term significance to some species of wildlife. The longer-range vegetation and habitat changes caused by flooding are likely to be minor due to the fact that much of the project area is marshland to begin with.

D. VEGETATIVE COVER AND TIMBER - PERIODIC INUNDATION

Some vegetation damage occurs as a result of flooding, but much of the vegetation in the reservoir area is of the sort that thrives in a marshy and wet environment. Most trees at lower elevations in the reservoir can usually withstand short periods of inundation. A critical factor for all vegetation is the season when inundation occurs; since flooding in the summer is more harmful than in early spring. The length of any period of inundation is also an important factor in the survival of flooded vegetation. Little permanent damage to vegetation which can be ascribed to periodic inundation is evident within the project area, however.

V. ALTERNATIVES TO THE OPERATION, MAINTENANCE AND MANAGEMENT PROGRAM

A. DISCONTINUANCE OF PROJECT OPERATION

1. Flood Control

Barre Falls Dam was built in 1958 to impound floodwaters originating in the headwaters of the Ware River. There have been eighteen significant reservoir operations since that time. The largest of these, in April 1960, utilized 55 percent of available storage capacity, and prevented \$770,000 in downstream damages. Were the flood of March 1936 to reoccur, it is estimated that Barre Falls Dam would prevent damages exceeding \$6 million.

It is clear that potential and real damages from flooding would increase in the absence of the protection afforded by the dam. Discontinuance of flood control operations cannot be considered feasible in view of the fact that downstream flood damages continue to be experienced almost every year.

2. Water Supply

The need for coordination of the operations at Barre Falls Dam with the water supply functions at the Coldbrook Diversion Intake, located downstream, is normally minimal. Both the Coldbrook Intake and Barre Falls Dam operate under run-of-the-river conditions, except during times of flood. Posing the alternative of project discontinuance at Barre Falls would impact upon the water supply and diversion at the Coldbrook Intake, in that, flow regulation during and after times of flooding would cease, therefore, potentially less water would be available for diversion purposes since excess flood waters would be released over the Coldbrook emergency spillway and pass downstream.

B. LAND MANAGEMENT ALTERNATIVES

1. Discontinuance of Land Management Activities

The proximity of the 557 acres of land owned in fee by the Corps of Engineers to the more than 21,000 acres owned by the MDC is important in any consideration of land management activities by either agency. Because the Corps land is defined by the physical limits and general vicinity

of the dam and three dikes this acreage is not very significant in terms of utilization by the visiting public. Land management practices in the combined Corps-MDC acreage focus on the non-intensive use of the area by fishermen, hunters, horseback riders and snowmobilers, and the greatest amount of this activity takes place on MDC land. Both the Corps and MDC have contractual agreements for fisheries and wildlife management with the Commonwealth of Massachusetts.

The management activities on MDC-owned land, which embraces most of the reservoir and extensive lands outside of the reservoir, have high returns in terms of public enjoyment and utility. Inclusion of the Corps land with that land owned by the MDC, for purposes of coordinated management is convenient, practical and mutually enhancing, and discontinuance of land management activities would be detrimental to the public interest.

2. Single-Purpose Versus Multiple Use Management

Current management of Corps property at Barre Falls Dam is focused on both wildlife management and recreational use of the land. The only developed facility is the small picnic site at the dam. Because of the wooded nature of the reservoir area, the small amount of Corps land, the water supply nature of the project area, the absence of a permanent pool, and the proximity of the much larger block of MDC acreage, it is not feasible to develop additional recreation facilities at this project.

It is difficult to separate, for management purposes, the Corps land from the MDC-owned land. But a forest improvement program similar to that

practiced on the MDC land could be expanded to some parts of the Corps property without conflicting with other uses.

In summary, the present management practices at Barre Falls Dam are compatible with environmental values found in the area and no extension or expansion of these uses, except for inclusion of some forest management, is warranted.

VI. THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

A. SOCIOECONOMIC EFFECTS

1. Flood Control Benefits

Impetus for the flood protection structures installed in the Chicopee River Basin came from the floods of March 1936 and the hurricane storm of September 1938. The September 1938 flood remains the flood of record along the Ware, Swift and Chicopee Rivers; more than 17 inches of rainfall fell at the town of Barre during the period from 17 to 21 September and runoff exceeded seven inches in most areas of the Ware River watershed.

Major floods on the Chicopee River, along which are large residential, commercial and industrial developments, may be caused by large contributions from the Ware River, as in September 1938, or the Quaboag River, as in August 1955. Simultaneous major floods in both of these tributary basins could produce a Chicopee River flood exceeding any that has yet been experienced. Estimates of direct damages from the 1938 flood along the Chicopee River are \$1,293,000 (1938 prices). Recurrence of this flood, would cause greater damage than any yet seen both because of increased replacement costs and the development of the flood plains which has taken place during the last two decades.

Since Barre Falls Dam is capable of lowering the stages of floods which might occur at potential damage centers downstream on both the Ware and Chicopee Rivers, damages can be significantly reduced.

2. Recreational Benefits

More than 500 acres of fee-owned land in the Barre Falls Reservoir are managed for hunting, fishing and other diversified recreational uses. Because of Federal ownership the area can be maintained in its basically undeveloped state for the protection of long-term environmental values. Moreover, because of proximity of the Corps acreage to a larger block of public land managed by the Commonwealth of Massachusetts for compatible recreational uses, the Federal property provides and enhances recreational facilities of appreciable value to the region.

B. BIOLOGICAL COMMUNITIES AND ECOSYSTEMS

1. Changes in Land Use

There has been some encroachment on the flood-prone areas downstream from Barre Falls Dam with most of these incursions occurring below the Ware River watershed. Because of increasing concern with long-term implications of such developments during the last few years, programs are now being considered and undertaken by all levels of government to preserve and protect flood plains and minimize social, environmental and economic costs relevant to the management of these resources.

2. Modification of Stream Flows

The Ware River flows unimpeded through Barre Falls Dam, except during times of flooding. Flows are then modified to conform with safe channel capacities downstream consistent with regulations of other flood control

dams in the Connecticut River Basin, and diversion requirements at the MDC's Coldbrook Intake. Because such regulation takes place only when a downstream flood hazard necessitates restriction of flows, effects on the river ecosystem are temporary. It is doubtful that major long-term ecological changes will result from occasional flow regulation by Barre Falls Dam.

VII. ANY IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF
RESOURCES WHICH ARE INVOLVED IN THE OPERATION AND
MAINTENANCE PROGRAM

Since Barre Falls Dam has become operative as much as 650 acres has been flooded by impounded waters. Significant storage operations occur almost annually, usually flooding at least 150 acres of the lowest-lying land in the reservoir. Storage operations have the effect of preventing natural successional changes on this portion of the reservoir area. Encroachment of forest species and slow alteration of the vegetational cover of the marsh is thereby forestalled for as long as inundations occur in these areas.

Since no pool is normally maintained at Barre Falls Dam, the streams within the reservoir have not been subject to the kinds of changes that would have accompanied maintenance of a permanent impoundment. Therefore, the aquatic biota now inhabiting the Ware River and tributaries are similar to those present before the dam was built. Survival and reproduction of these species may be disturbed temporarily by flood control operations, but in the long run the ecology of the wetlands and streams in the reservoir area is maintained.

VIII. COORDINATION WITH OTHER AGENCIES

Coordination with various Federal, State and local interests resulted in valuable input to this assessment. Both meetings and correspondence proved to be very helpful. Following is a list of those groups with whom coordination took place:

U.S. Fish and Wildlife Service

Metropolitan District Commission

Massachusetts Division of Fisheries and Wildlife

Central Massachusetts Regional Planning Commission

CONCLUSIONS

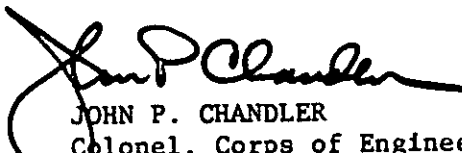
Upon evaluating the material presented in this Environmental Assessment, it is my belief that continued operation, maintenance and management of the Barre Falls flood control project is in the best public interest. To discontinue operation of this project could cause serious flooding downstream of the dam with significant property damage. Public recreation opportunities provided at the project would also be lost if management of the area ceased.

Environmentally, the operation, maintenance and management of Barre Falls Dam has only a minor impact. The downstream aquatic and terrestrial ecosystems have been altered somewhat due to reduced natural flooding. Impoundment of flood waters in the reservoir has minimal effects on fish reproduction, wildlife habitat and vegetation since the duration of inundation is usually rather short and often at non-critical times of year.

Therefore, since the environmental impacts of continued operation, maintenance and management of the Barre Falls Flood Control Reservoir are minor, a formal environmental statement is not required under the provisions of the National Environmental Policy Act of 1969.

It is my opinion that the public will best be served by continuing operation of Barre Falls Dam.

31 May 1977
(date)


JOHN P. CHANDLER
Colonel, Corps of Engineers
Division Engineer